

Using Synthesis
Synthesis Reference Manual Three

The Synthesis team appreciates your comments, especially if you find any instructions confusing or difficult to follow. For assistance, please contact:

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Section One:

Launching Synthesis

Synthesis

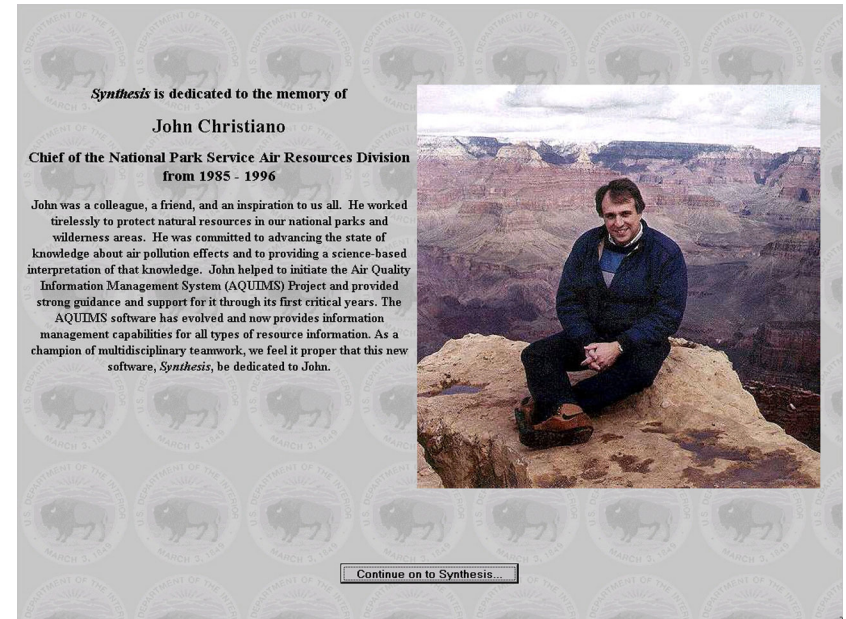
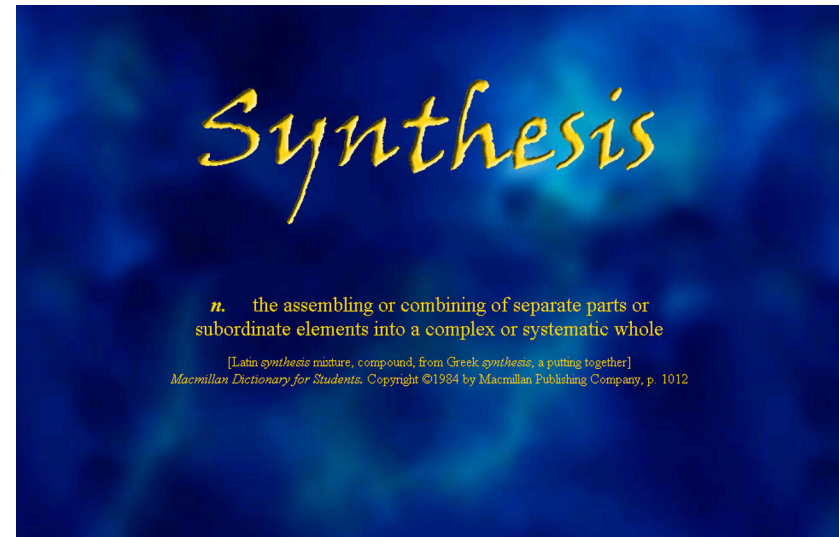
Synthesis is a software package that provides a computerized framework for delivering resource information in an efficient manner.

Synthesis is a cooperative effort between the National Park Service and Penn State University. *Synthesis* is dedicated to the memory of John Christiano, Chief of the National Park Service Air Resources Division from 1985 to 1996.

After selecting a site of interest in *Synthesis*, the user has direct access to various data such as: site information, documents, spreadsheets, databases, GIS data, annotated references, summary monitoring information, photographic libraries, web sites, and embedded decision support systems (DSS).

Launching Synthesis

To launch *Synthesis*, go to Windows Start button. Navigate to Programs and then select *Synthesis*.

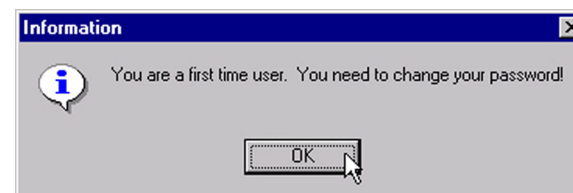
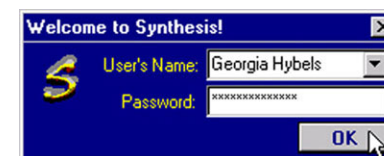
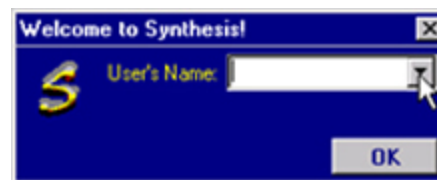


Logging into Synthesis

When the *Synthesis* application opens, you will go through some startup screens. To skip these screens, press the **Esc** button. A dialog box will appear asking for a user name. Begin typing your name or click on the **down arrow to get the drop-down list of users**. Select your name. You will then be asked to type in your password.

The first time you use *Synthesis*, your password is your name **EXACTLY** as it appears in front of you in the dialog box, including any uppercase letters and spaces. The program will then ask you to provide a new password.

First, type your old password (your name); then, type a new password. It must be at least **six** characters and can contain both letters and numbers. Retype your new password and click on **OK**.



Obtaining the Site Menu

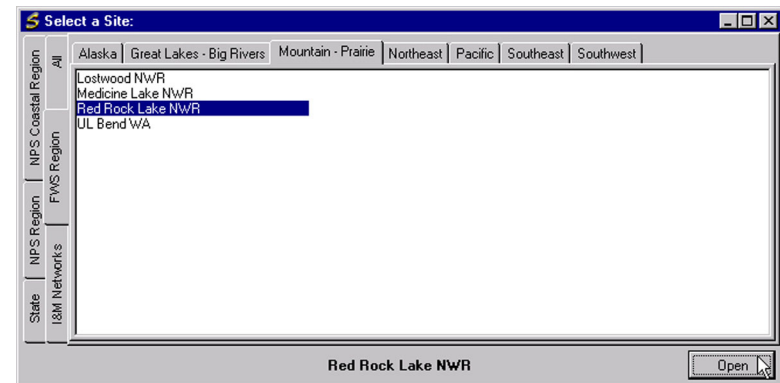
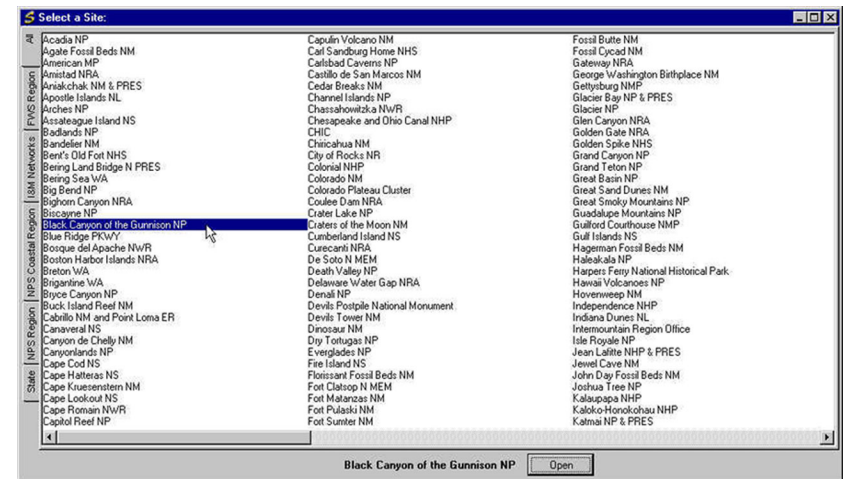
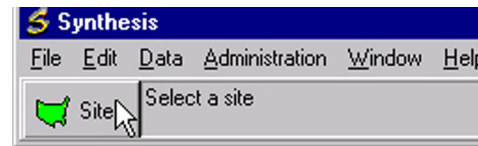
Once *Synthesis* opens, you will see a *Synthesis* toolbar across the top of your monitor screen. If the toolbar is not as wide as your monitor screen, stretch it out across the top of your screen. The program will store that size, so that the next time you log in, the toolbar will default to the width you set.

The Site Selection window should open automatically, if not click on the **USA map icon** to select a site.

Selecting a Site

There are several options for selecting a site to view in *Synthesis*. The default option is the “**All**” tab, in which all installed sites are listed in alphabetical order. Locate the site, click on its name, and then click on **Open**. You can also click on a site’s name to open it.

Installed Fish and Wildlife (FWS) sites are organized by FWS region under the “**FWS Region**” tab. Click on the individual region tab and locate the site. To open the site, double-click on the site name -- or click on the site name, and then click on **Open**.

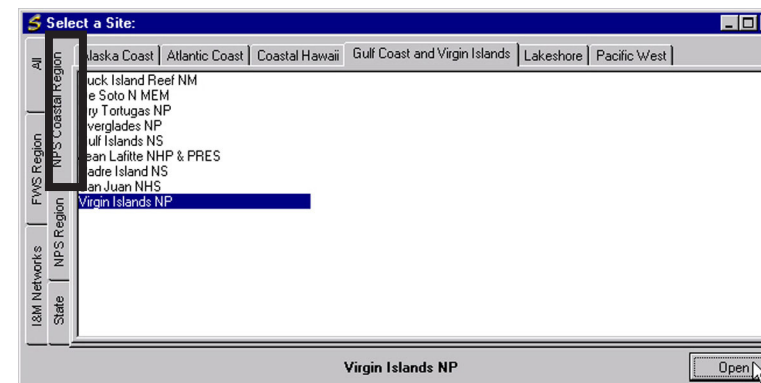
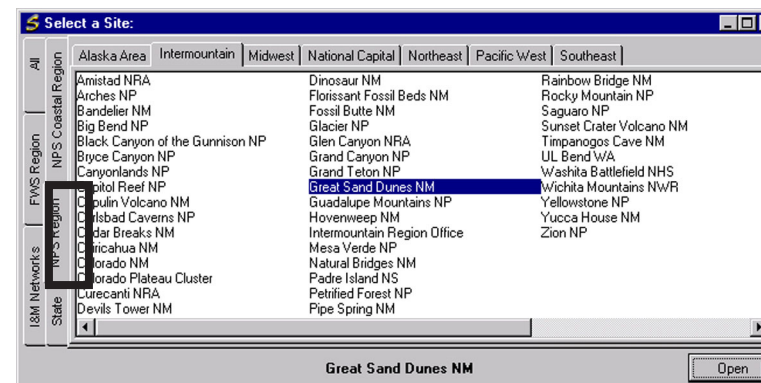
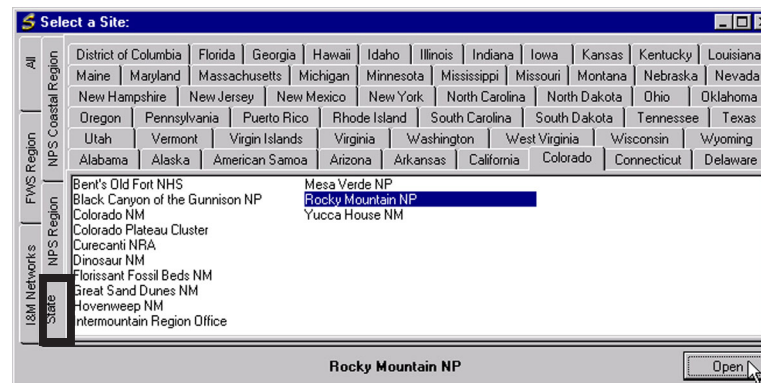


To browse sites by state, click on the individual state tab under the main “**State**” tab. Locate the site and double-click on the site name -- or click on the site name and then click on **Open**.

National Park Service (NPS) sites can be located using the “**NPS Region**” tab. Select the appropriate region tab, and locate the site. Double-click on the site name -- or click on the site name and then click on **Open**.

You may also select an NPS coastal park by using the “**NPS Coastal Region**” tab. Select the individual region tab, and locate the site. Double-click on the site name -- or click on the site name, and then click on **Open**.

Another option is to select an NPS park by using the “**I & M Networks**” tab. Select the individual “**I & M Network**” tab, and locate the site. Double-click on the site name-- or click on the site name, and then click on **Open**.



Section Two:

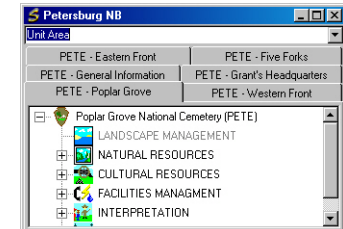
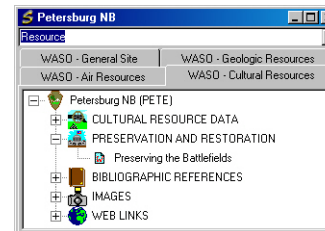
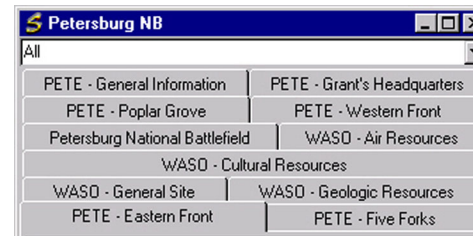
Outlines and Data Items

Synthesis Outlines and Data Items






Once you have selected a site in *Synthesis*, you can view each of the outlines available for that site. Click on the outline tab (e.g. General Site, Air Resources, or Pete-Poplar Grove) that you want to view.

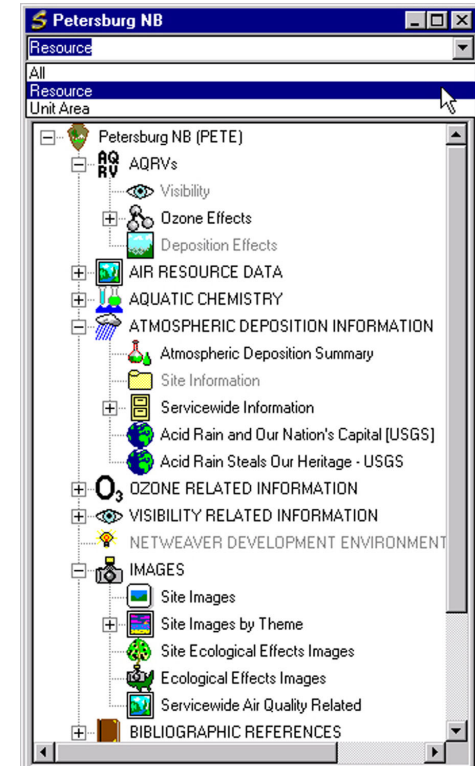
You can toggle between viewing all outlines for a given site or outline sets created for that site, such as Resource and Unit Area sets created for Petersburg NB, in the example at right.

To expand an outline, click on the plus sign located next to the site name. Then, click on the plus sign to expand any of the suboutlines of each category.



Main Icons in the Outline

-  Word Document™
-  Datasets
-  Access™ Database
-  Excel™ Database
-  Image
-  Web Link



Opening a Data Item

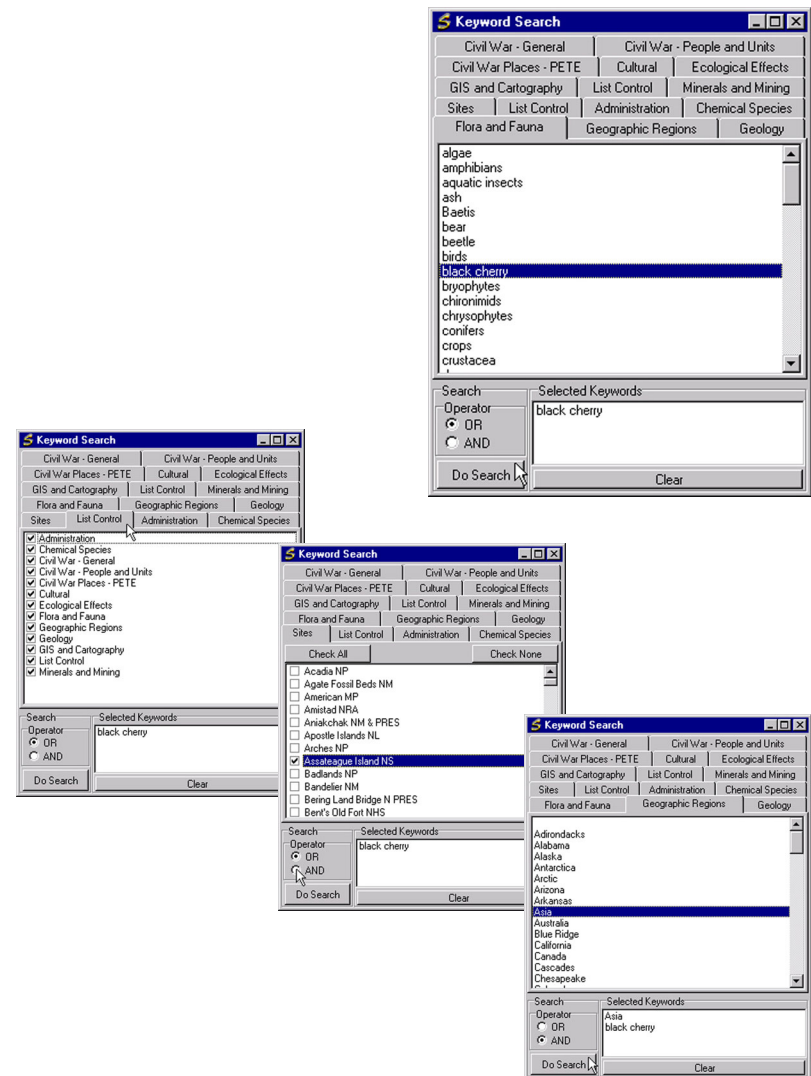
To open a data item located in the site outline, highlight the item and double-click on the data item in the outline. Or, click on the **Open the Resource** button located at the bottom of the site-outline. (Depending on screen settings, you may not be able to see the **Open the Resource** button).

Performing a Keyword Search

Once you have a site outline opened, you can do a keyword search to find any data items that might relate to a topic of interest. Click on the **Keyword Search** button located at the bottom of the outline. When the “**Keyword Search**” window appears, check any and all (or none) of the sites.

The “**List Control**” tab contains a list of all keyword lists and allows you to control the keyword lists that are displayed in the Keyword Search window. Under the “**List Control**” tab, check any or all of the keyword lists you would like *Synthesis* to display. Under each tab is a list of keywords relevant to that topic.

Under each keyword list tab, double-click on the word(s) you would like included in your keyword search. Select the “**or**” or “**and**” option under the **Search-Operator** box. You’ll see each selected keyword appear in the **Selected Keywords** field. Your keyword search will be based on the words in that window.



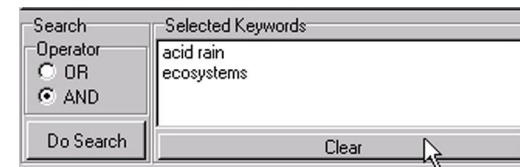
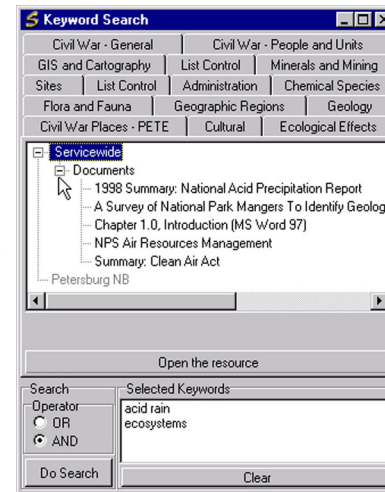
Performing a Keyword Search

Once you have selected keyword(s), click on the **Do Search** button.

When the search is completed, a list of all the site and servicewide locations and the data items will appear in the “**Keyword Search**” window. Data items containing your keyword(s) can be found in site or servicewide locations that are not grayed out.

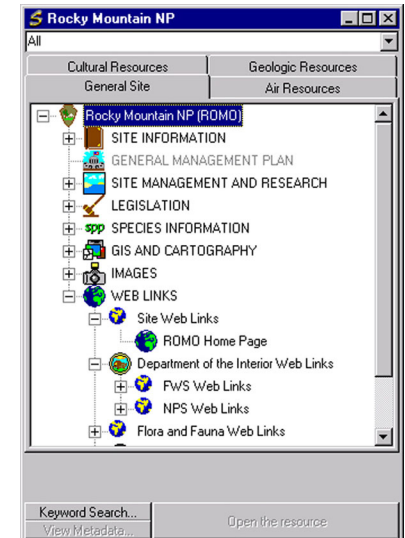
Scroll down the list to browse the available data items. When you locate an item of interest, double-click on it to open it in its native application (such as Microsoft Word™.)

Click on **Clear** to remove selected keywords so that you can begin a new keyword search.



Using Web Links

Selected web links are located in the various outlines under the **WEB LINKS** category. You must have an internet connection to access web sites using *Synthesis*.



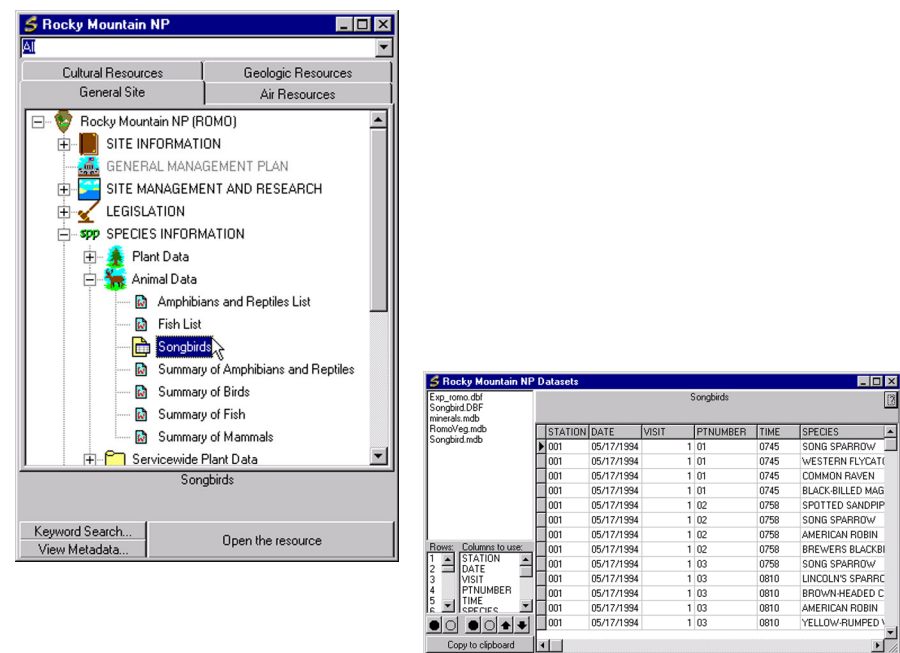
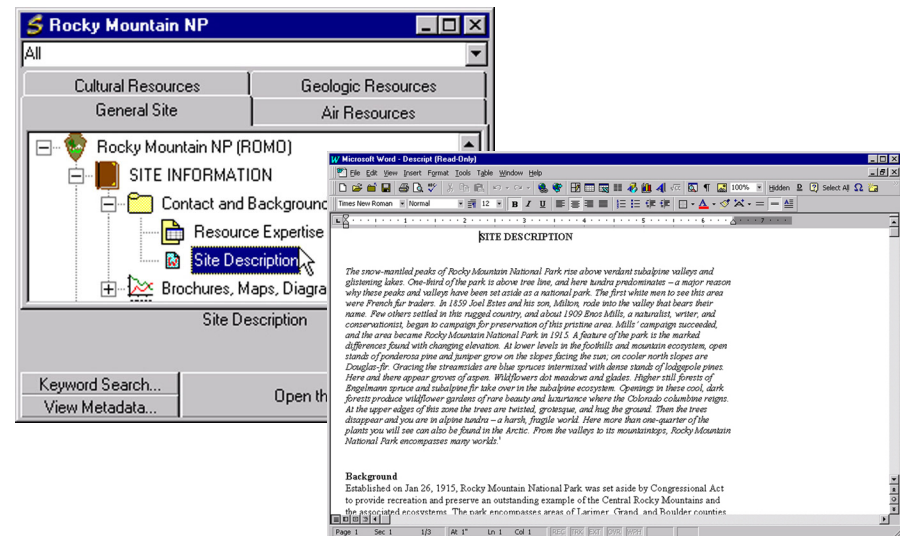
Working with a Word Document

Top view a Word™ Document, highlight the item and double-click (or click on the **Open the Resource** button after clicking on the item.) Double-clicking on a document opens Microsoft Word™ as well as the document you selected. For example, if you were to double-click on the **Site Description** document under **SITE INFORMATION/ Contact and Background**, you would bring up the document in Word™. The document may now be manipulated in the same manner as any Microsoft Word™ document.

Working with Datasets

Datasets including Access™ databases and Excel™ Spreadsheets, can be viewed or copied into other applications. To view a dataset, double-click on the item (or click on the **Open the Resource** button after clicking on the item). Double-clicking on the dataset item will open the file in its original application.

Several custom databases are within Synthesis. When opened, they will appear as the database shown in the lower right. For these databases, if you wish to copy only certain columns and rows, select them in the lower left corner of the datasets window. To select multiple rows and columns, hold down the **Ctrl** key while clicking the mouse.



Opening the Site Species List

The **Site Species List** is a subset of the Natural Resource Conservation Service (NRCS) PLANTS database, which contains a list of plant species found at that site. The entire **Site Species List** can be copied to the clipboard by clicking on the **Copy** button at the top of the list.

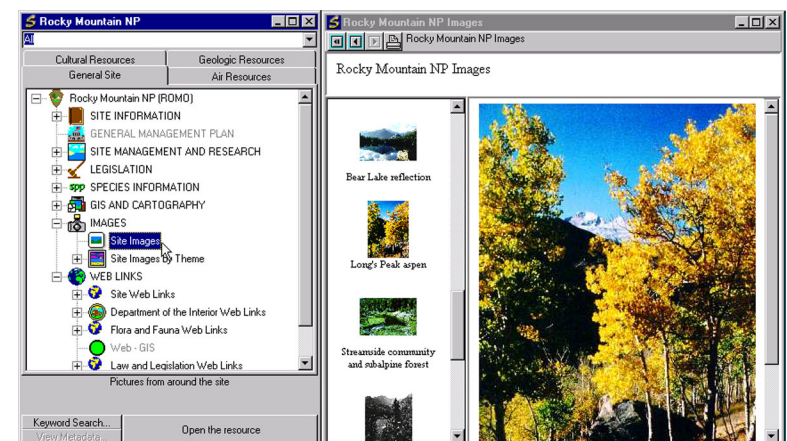
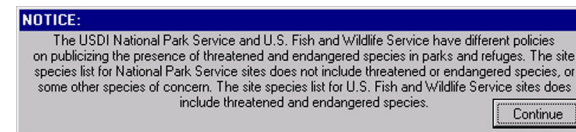
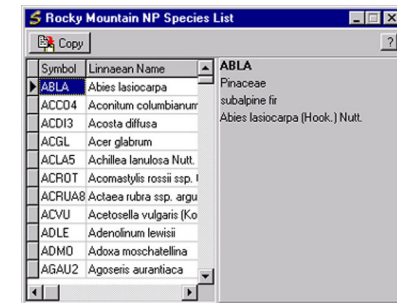
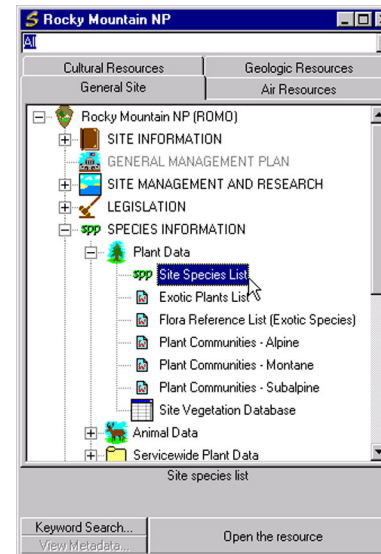
For some sites, the site species list is also available as a Microsoft Access™ database called “Site Vegetation Database.” In the near future, *Synthesis* will be using NPSpecies as the source for plant species at NPS sites.

Opening a Site Image

Double-click on **Site Images** to open the file of images for the site. To view an image, click on the thumbnail image on the left-hand side of the window.

These images can be copied and pasted into other applications by placing the mouse cursor on the large format picture at the right and right-clicking on **Copy**. All of the **Image** files under the **IMAGES** category open and copy the same way.

To print the enlarged picture, click somewhere in the image area, and then, click the **printer icon** at the top of the window.



Opening a Site Image Set

You can locate a particular type of image more efficiently under the Site Images by Theme category using the image sets created for that site. Double-click on an image theme. Then, click on any thumbnail to view the large format JPEG version of the picture. Images can be copied and pasted into other applications by placing the mouse cursor on the large format picture at the right and right-clicking on **Copy**. To print the enlarged picture, click somewhere in the image area, and then, click the **printer icon** at the top of the window.

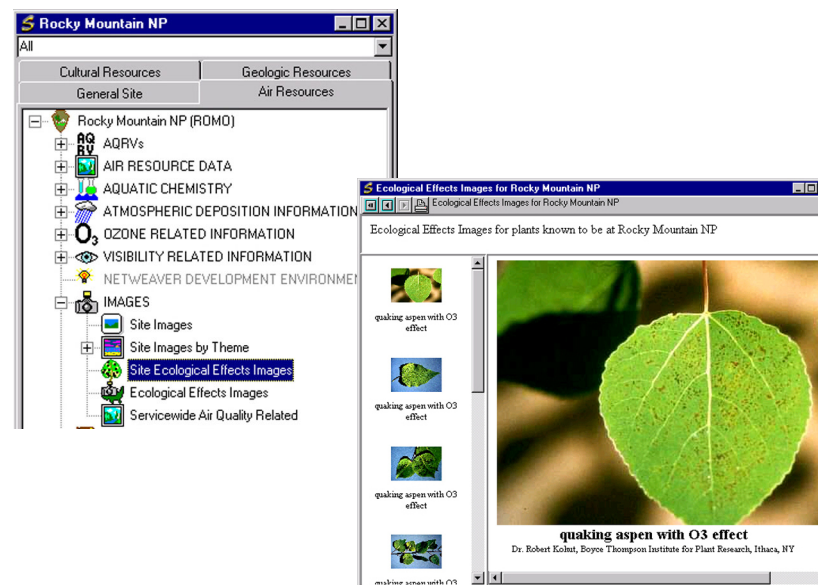
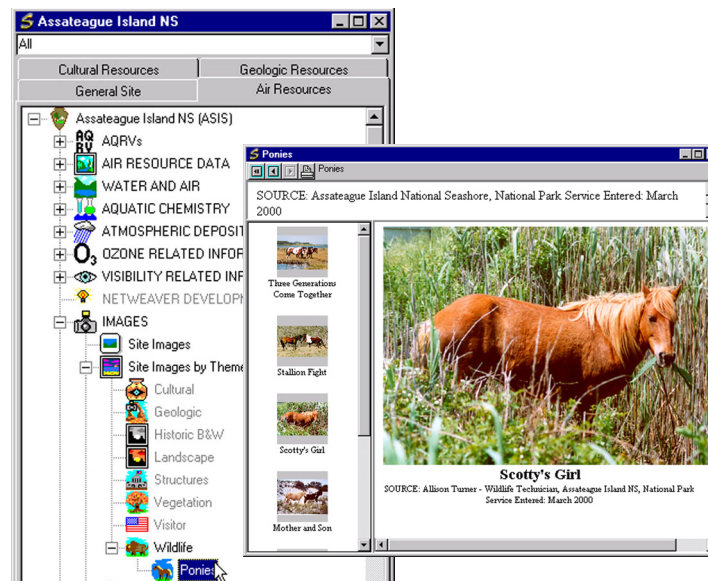
Working with Other Images

Other specialized image sets, including **Site Ecological Effects Images**, **Ecological Effects Images**, and **Servicewide Air Quality Related Images** may be viewed within the respective tab, such as Air Resources.

To view an image, click on the thumbnail on the left side of the screen. To print an image, click anywhere in the image area and click on the **printer icon**. To copy an image, place the mouse on the large format picture, right click on the mouse, and click on **Copy**.

Ecological Effects Images: displays a library of images illustrating pollution effects on various plants, not limited to those found in the selected site.

Site Ecological Effects Images: provides pictures of air pollution effects on vegetation found at the site.



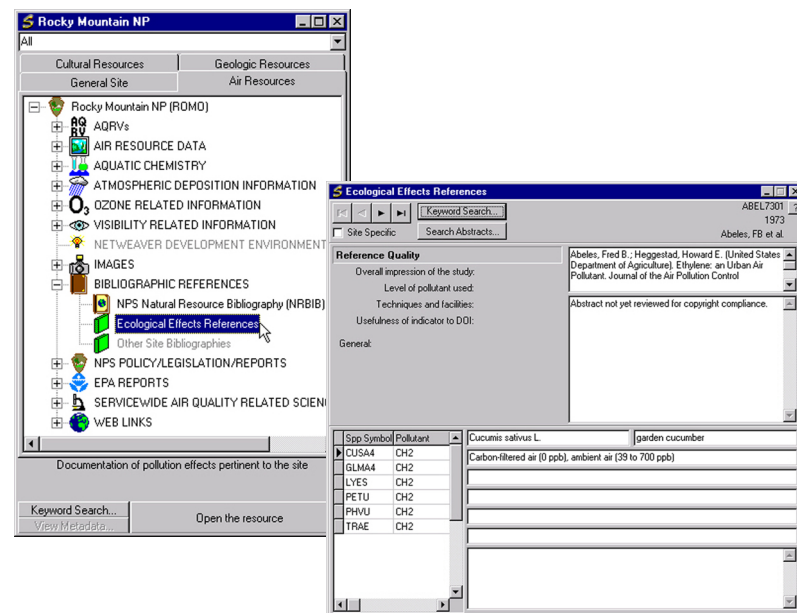
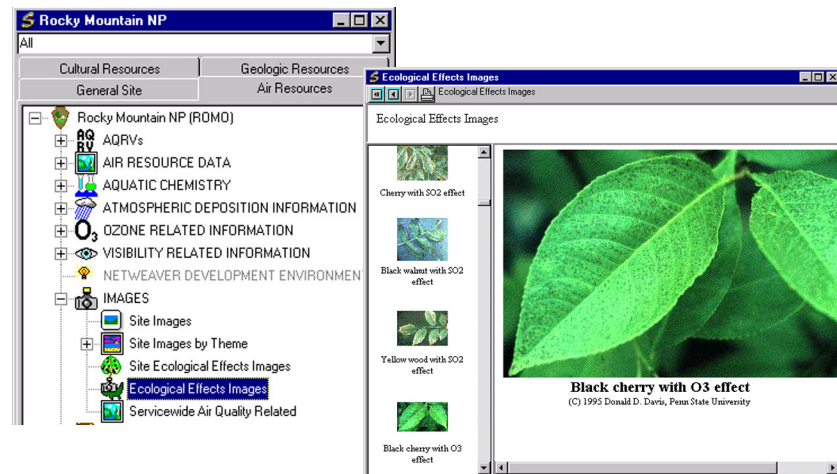
Working with Other Images

Servicewide Air Quality Related Images: includes images related to air quality monitoring that are relevant to all sites.

Using Ecological Effects References

The ecological effects references section is located under the **BIBLIOGRAPHIC REFERENCES** category in the Air Resources outline. The **Ecological Effects References** provides basic bibliographic citations. In some cases interpretation concerning experimental techniques and usefulness of the study to the US Department of Interior are provided.

If you double-click on the **Ecological Effects References**, The “**Ecological Effects References**” window appears. In this window, you can either perform a keyword search or search among the references that are present in the database.



Using Ecological Effects References

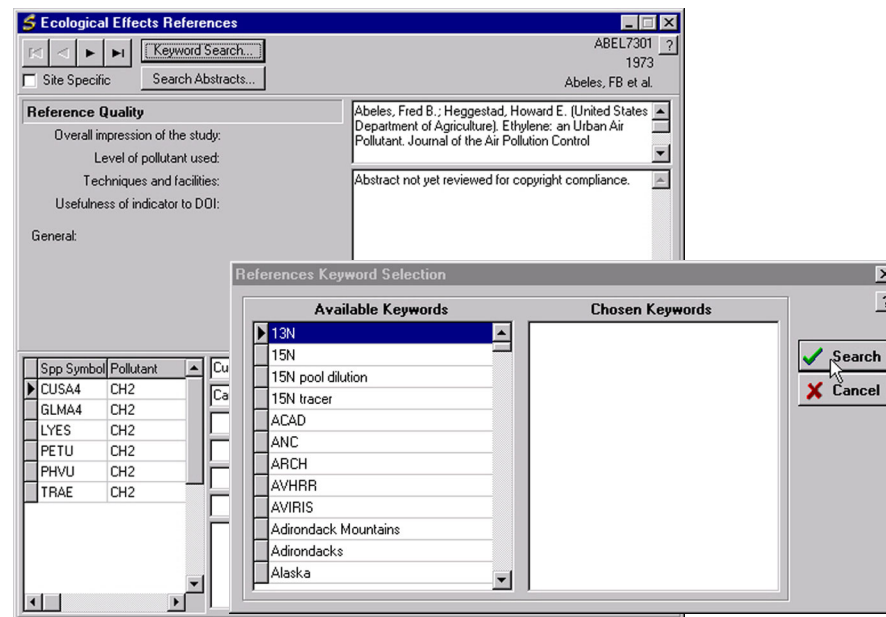
To perform a keyword search, click on the **Keyword Search** button. Then, double-click on the word(s) in the column on the left side of the window for which you want to search. If you want to delete “**Chosen Keywords**,” double-click on the word(s) on the right side of the window. After you have selected keywords, click on the **Search** button. Click on **Cancel** to exit the “**References Keyword Selection**” window.

You may also search references that are available. Click on the **Search Abstracts** button. In the “**Find**” window that appears, type in your search string and click on **Find Next**. Click on **Cancel** to exit from **Search Abstracts**.

Opening a GIS Project

GIS data may be presented through ArcExplorer™ projects, ArcView™ projects, and the NPS Theme Manager. For instructions on using ArcView™ and the NPS GIS Data Browser, click on the Help files in those applications.

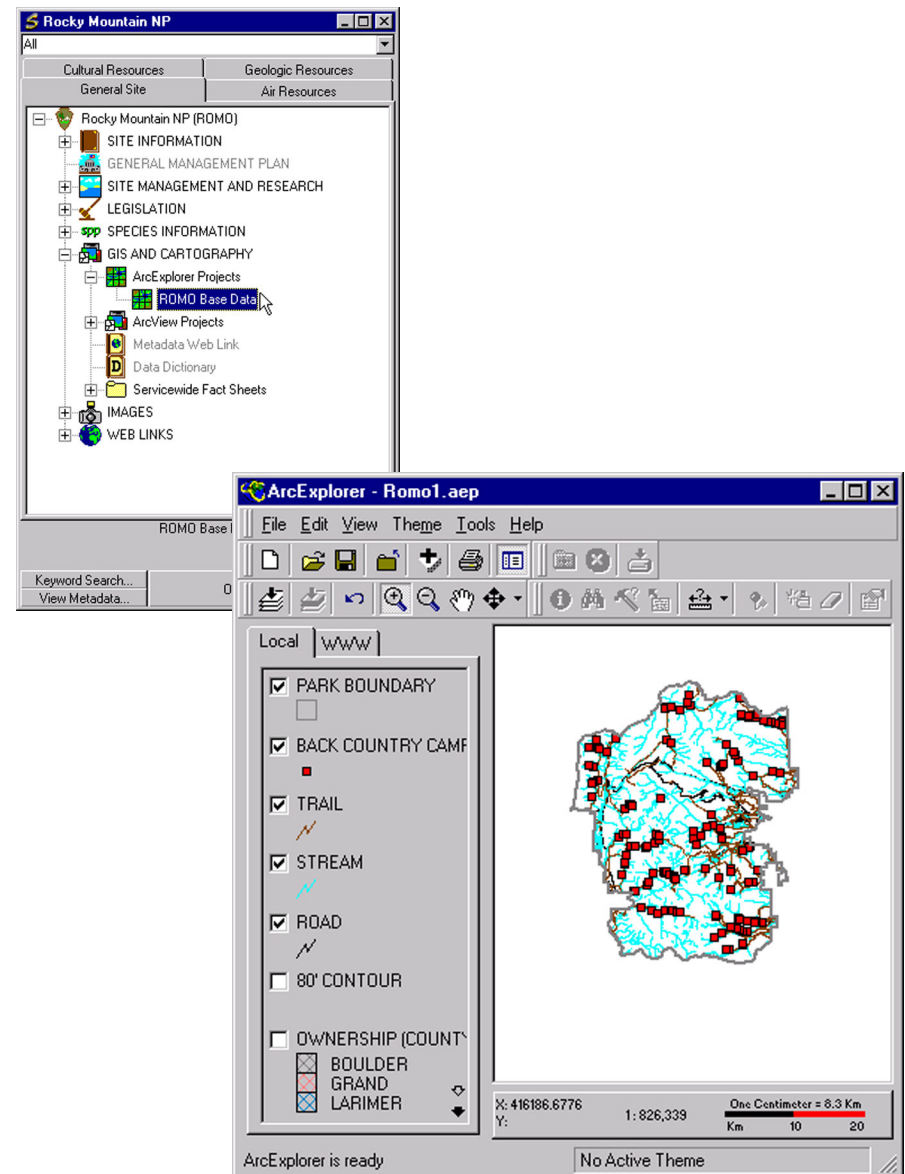
If ArcExplorer™ is not installed on your computer, ask your system administrator to install it from the Synthesis CD. The following pages contain brief instructions on using the basic functions available in ArcExplorer™ GIS data browser.



To view GIS data in ArcExplorer, locate the ArcExplorer™ project in the site outline. Double-click (or highlight and click on the **Open the Resource** button) on the project name or icon.

ArcExplorer™ opens and a project, such as ROMO Base Data (file name Romo 1.aep) is displayed. Checking the box beside each theme displays the features of that theme. To turn off the display of any theme, uncheck the box. A theme is made “active” by clicking on the theme name. The theme name will appear slightly raised.

NOTE: The complete instruction manual for ArcExplorer™ has been included on the *Synthesis* Installation CD; contact your system administrator. The manual is also available in .pdf format from the following web site: <http://www.esri.com/software/arcexplorer/aedownload.html>. You will need Adobe Acrobat Reader™ (also a free software) to open the .pdf file. Adobe Acrobat Reader™ is available from the following web site: <http://www.adobe.com/prodindex/acrobat/readstep.html>.



Working with GIS Data

The **Zoom to Full Extent** button zooms the view so all themes included in the project are visible.

The **Zoom to Active Theme** button zooms the view to the extent of the “active” theme in the project.

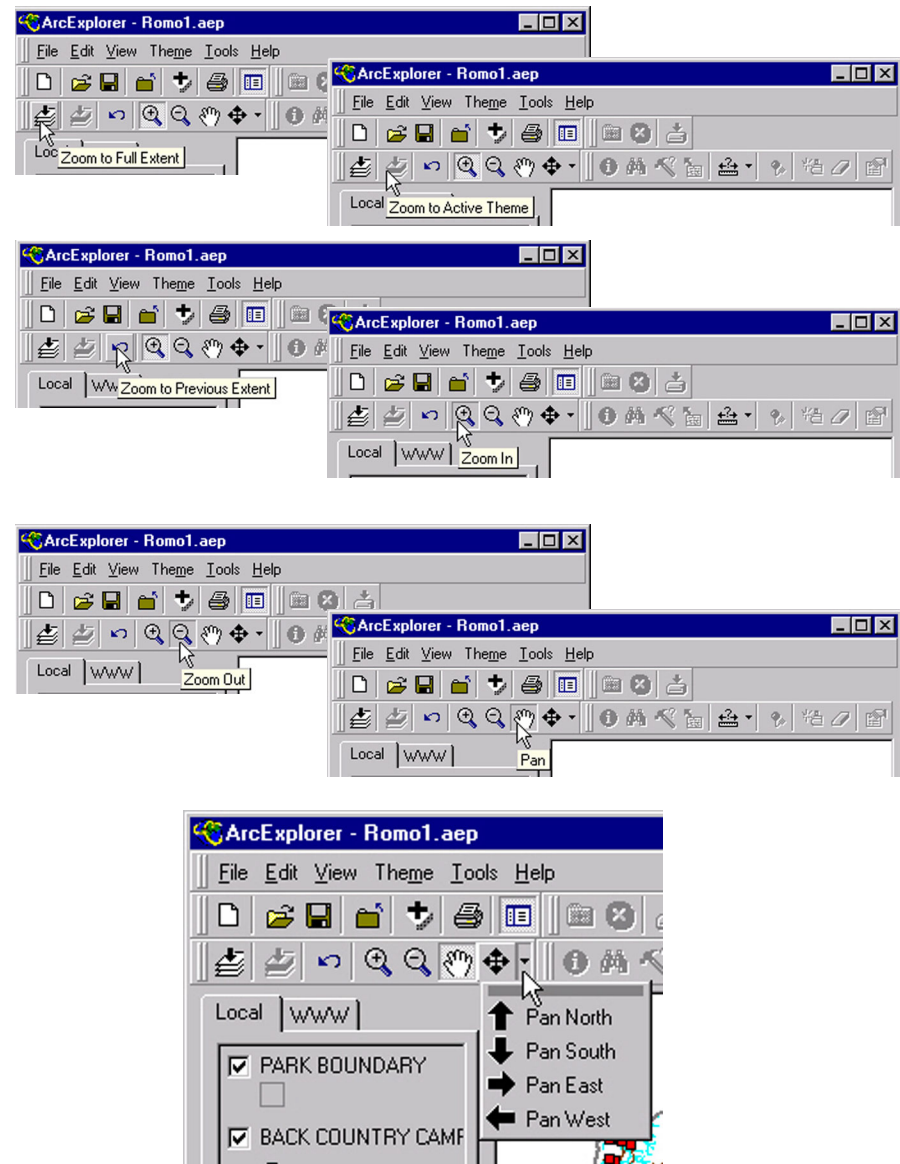
The **Zoom to Previous Extent** button zooms the view to the previous setting.

Use the **Zoom In** button to zoom in on a theme from a specific point. Clicking on a spot using this button will zoom the view. Repeated clicking will progressively zoom the view. You can also use the **Zoom In** button to select an area on which to zoom in. Click on the **Zoom In** button, hold down the left mouse button, and drag to select an area on which to zoom.

Use the **Zoom Out** button to zoom out on a theme from a specific point. Clicking on a spot using this button will zoom the view. Repeated clicking will progressively zoom the view. You can also use the **Zoom Out** button to select an area to zoom out from. Click on the **Zoom Out** button, hold down the left mouse button, and drag to select an area from which to zoom.

The **Pan** button allows you to move throughout the view and to bring into view any features outside the current map extent.

The **Pan Arrow** button allows you to move throughout the view by direction and to bring into view any features outside the current map extent.

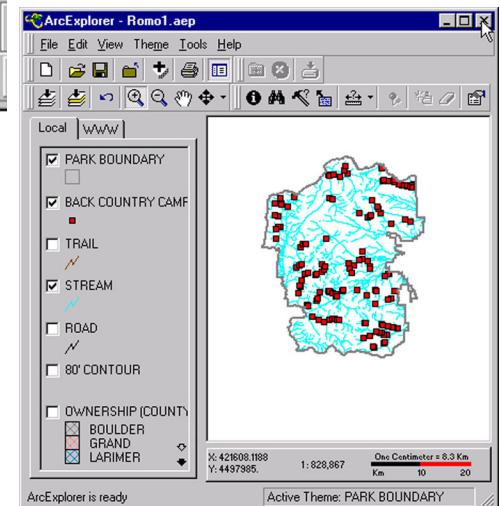
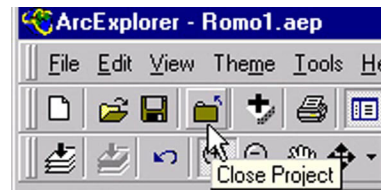
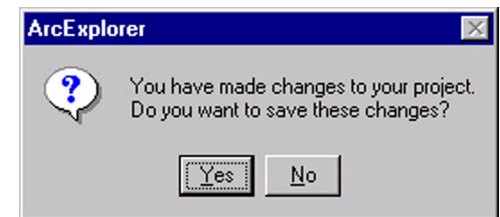
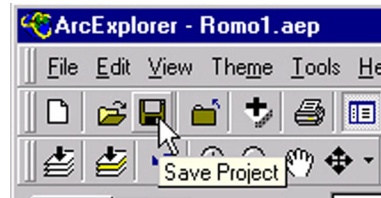
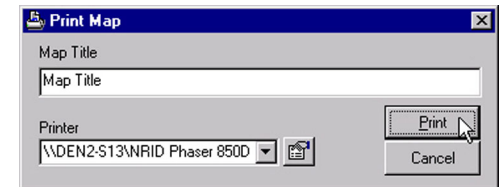
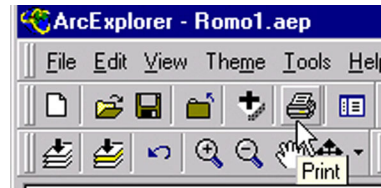


To print the view you see using the default map layout provided, click on the **Print** icon.

We recommend that you **DO NOT** save the project prior to exiting the ArcExplorer™ GIS data browser. However, please note that if you do click **Save Project**, you will not be able to overwrite the original project. ArcExplorer™ is integrated with *Synthesis* in a way that prevents the overwriting of the original project file.

The results of any **Save Project** action are written to a copy of the project file and are stored at **C:\Temp**. If you do make changes to the symbolization and display and would like to save them, then click on **Save Project**. A copy of the project file will be saved at **C:\Temp**. You may then view the saved version of the project by directly opening the ArcExplorer™ application installed on your hard drive.

To **close** ArcExplorer™ project, click on the **Close Project** icon. Or, click on the **(X)** in the upper right-hand corner of the project window as in the example to the right.



Section Three:

Aquatic Chemistry Decision Support System

Aquatic Chemistry Decision Support

The **Aquatic Chemistry Decision Support System (DSS)** can be found in the Air Resources outline under the AQUATIC CHEMISTRY category.

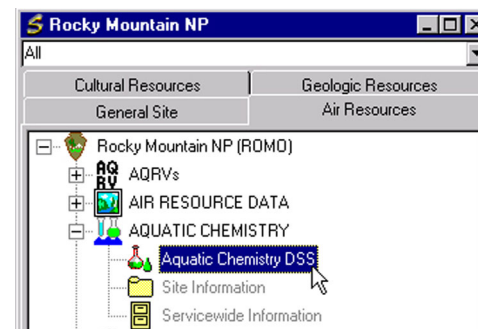
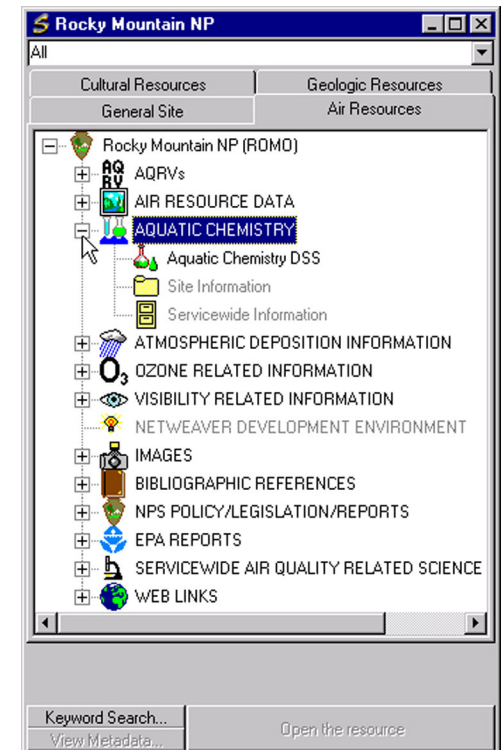
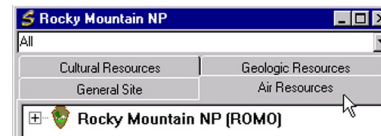
NOTE: You can run the Aquatic Chemistry DSS **ONLY** if you have a valid MapObjects™ license **AND** if *Synthesis* was installed on your computer using the “**Custom**” install option.

Also, if you open the Aquatic Chemistry DSS under a site, and get the message “**Valid object expected as argument**” (when you click on “**Load Aquatic Chemistry GIS**”) -- it means that no aquatic chemistry data are available for that site.

You can contact the *Synthesis* development team if you have questions or need more information. Contact information is provided on the first page of this manual.

Aquatic Chemistry DSS

The **Aquatic Chemistry Decision Support System (DSS)** was developed by experts nationwide using sets of regional rules and assists resource managers who must characterize the chemical status of surface waters. The system requires specific data inputs or it will not operate.

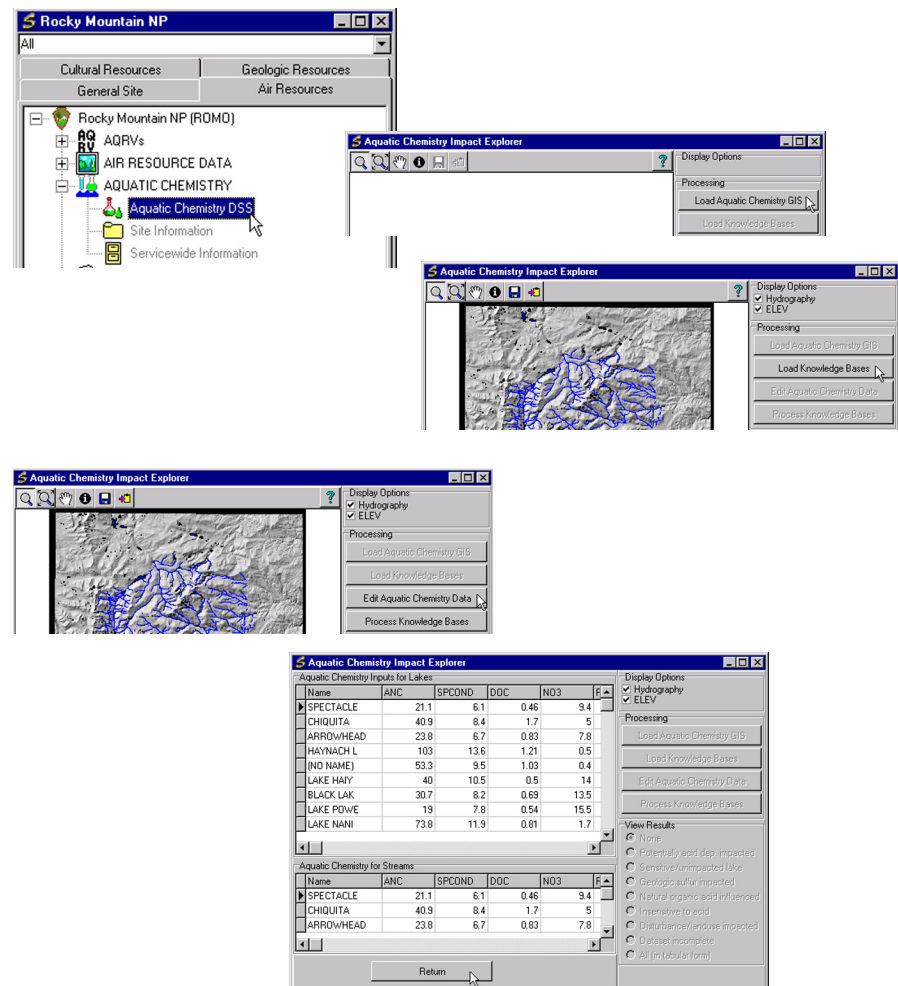


Aquatic Chemistry DSS

The following steps demonstrate the use of the decision support system. This example will use the data obtained at Rocky Mountain NP. The data for this system must be collected locally.

Double-click on the **Aquatic Chemistry DSS** category to open the decision support system. Click on **Load Aquatic Chemistry GIS**. Then, click on **Load Knowledge Base**.

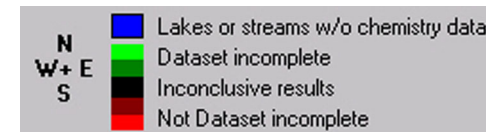
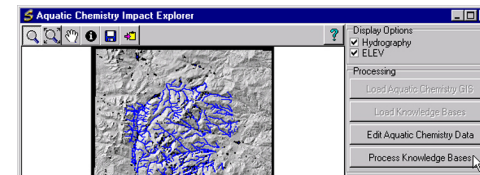
Click on **Edit Aquatic Chemistry Data**. The “**Aquatic Chemistry Impact Explorer**” window will appear. This window shows USGS data for various lakes and streams at Rocky Mountain National Park. You could edit the data at this point, however, note that the original dataset cannot be overwritten and will revert to the original values when the application is closed. To exit this window and return to the main Aquatic Chemistry DSS window, click on **Return**.



Aquatic Chemistry DSS

Click on **Process Knowledge Base**. Processing the knowledge base produces a list of spatially-referenced outcomes. Selecting an outcome will result in a new display on the map. In some instances, you may need to zoom in on the view to see the results for smaller bodies of water.

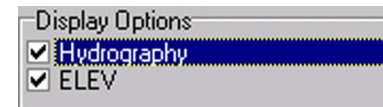
The color legend represents the degree to which an outcome is true or false for a given surface water. **Light green** signifies **completely true**, and **red** signifies **completely false**. Other shades represent greater or lesser degree of trueness based on fuzzy logic of captured expertise by nationwide experts.



Tools for the Aquatic Chemistry DSS

In the ROMO example, the **Display Options** window includes **Hydrography** and **Elevation**. As the default, the software has both boxes checked. To remove a data layer from the display, uncheck the box for that layer under the **Display Options** window.

The **Zoom In** tool allows you to select an area on which to zoom. When you click on the **Zoom In** button, a set of crosshairs appear. Hold the left mouse button and drag to define your area of interest.



The **Zoom to Full Extent** tool zooms the view to the extent of all themes included in the map image.

The **Identify** button allows you to identify a surface water's name. Click on the **Identify** button, and then click on a surface water feature. The feature's name will appear at the top of the window, to the right of the tools buttons if the feature name has been entered into the GIS database.

The **Pan** tool will allow you to move throughout the map image and to bring into view any features outside the current map image extent.

To save the map image, click on the **Save Map** tool. The "**Save Map Image As**" window will appear and will allow you to save the image as an image file in the location of your choice.

You can use the map image in a Word™ document. To do so, copy it to the clipboard by clicking on the **Copy to Clipboard** tool key. Open an application such as Microsoft Word™. Then, simply paste the map image into the document.



Section Four:

Atmospheric Deposition Information

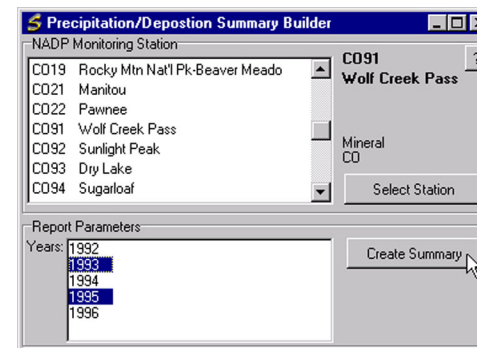
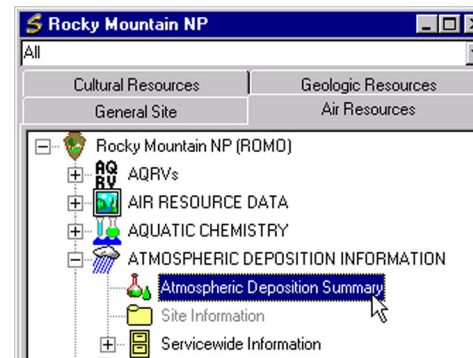
Atmospheric Deposition Summary

The **Atmospheric Deposition Summary** can be found in the Air Resources outline under the ATMOSPHERIC DEPOSITION INFORMATION category. To view atmospheric deposition data collected under the National Atmospheric Deposition Program (NADP), double-click on **Atmospheric Deposition Summary**.

Summary Builder

To select a monitoring station, click on the **station name**. Then, click on **Select Station**. If there is a NADP monitoring station at the site you are currently in, the software should automatically highlight that station. If the site has no monitoring station, the software defaults to the first station listed or a nearby monitoring station designed by NPS Air Resources Division. Data from all stations in the NADP network are available.

Next, select the **year(s)** you would like to see. To select multiple years, hold down the **Ctrl** key clicking on the years. Click on **Create Summary**.



A window similar to the one to the right will appear after you click on **Create Summary**. The upper portion of the screen provides locational information for the monitoring site. Below that information are precipitation and deposition chemistry data for the selected years at that site.

The parameters displayed in the window to the right were identified by nationwide atmospheric deposition experts as key indicators.

Select **“Click here to save historical atmospheric deposition summary data”** to save the precipitation and deposition data to a file. Unless otherwise specified, the data are saved as a text file to **C:\temp\depsum.txt**.

The entire NADP data set is available at the NADP web site. The direct link will work ONLY if you have an internet connection.

Click on the following web address at the bottom of the NADP window to activate your web browser and go to the NADP web site:

<http://nadp.sws.uiuc.edu>

NADP/NTN ANNUAL ATMOSPHERIC DEPOSITION SUMMARY

SITE IDENTIFICATION

Site: Wolf Creek Pass Elevation (m): 3292
 State: CO Latitude: 37° 28' 7" N
 County: Mineral Longitude: 106° 47' 25" E
 Site Number: 61540
 CAL code: C091

PRECIPITATION - WEIGHTED MEAN CONCENTRATIONS (mg/L)

YEAR	Ca	Mg	K	Na	NH4	NO3	Cl	SO4	pH (lab)	Precip (cm)
1993	0.1	0.012	0.014	0.044	0.09	0.63	0.06	0.64	4.94	147.13
1995	0.1	0.011	0.011	0.039	0.1	0.69	0.05	0.61	4.85	146.44

DEPOSITION (kg/ha)

YEAR	Ca	Mg	K	Na	NH4	NO3	Cl	SO4	Precip (cm)
1993	1.43	0.177	0.206	0.647	1.29	9.23	0.82	9.37	147.13
1995	1.54	0.161	0.161	0.571	1.42	10.1	0.75	8.95	146.44

[Click here to save historical atmospheric deposition summary data](#)

SOURCE: 1996 National Atmospheric Deposition Program/National Trends Network Annual Data Summary. To obtain the complete report, visit the NADP/NTN Home Page at: <http://nadp.sws.uiuc.edu>

[Click here to save historical atmospheric deposition summary data](#)

SOURCE: 1996 National Atmospheric Deposition Program/National Trends Network Annual Data Summary. To obtain the complete report, visit the NADP/NTN Home Page at: <http://nadp.sws.uiuc.edu>

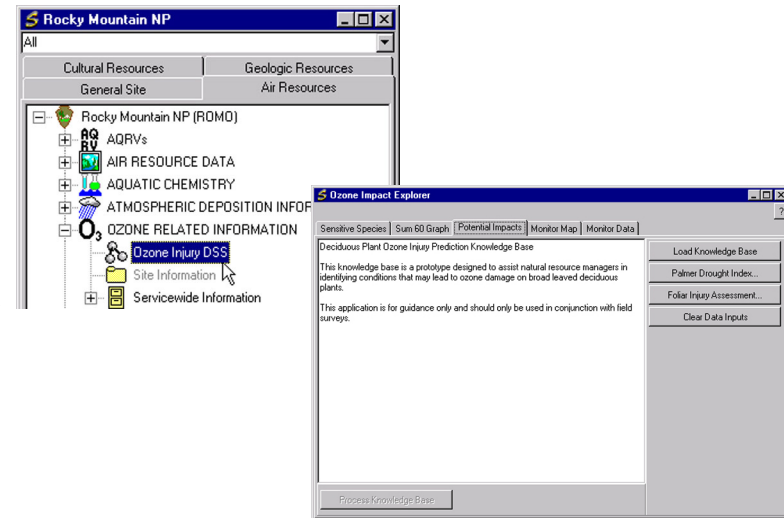
Section Five:

Ozone Injury Decision Support System

Ozone Injury Decision Support System

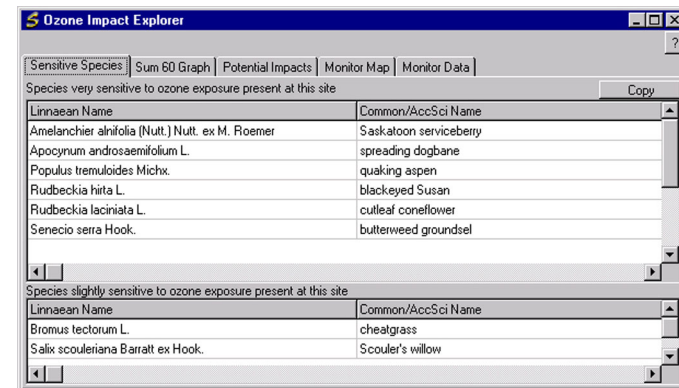
The **Ozone Injury Decision Support System (DSS)** can be found in the Air Resources outline under the OZONE RELATED INFORMATION category. The **Ozone Injury DSS** provides various types of information relating to ozone effects on vegetation. If you double-click on **Ozone Injury DSS**, the “**Ozone Impact Explorer**” window will appear. As the default, the “**Ozone Impact Explorer**” window opens up immediately with the “**Sensitive Species**” tab activated. At this point, information can be accessed under the various tabs.

NOTE: The software builds the graphs on the fly, so it takes some time to display them. Please be patient. Also, information may not be available under every tab for all sites.



Ozone Impact Explorer Tabs

The “**Sensitive Species**” tab opens a list of plant species located at the site that are either very sensitive or slightly sensitive to ozone. Both scientific and common names are provided. You can copy the sensitive species list to the clipboard and then paste it into a Word™ document. Just click on **Copy**, and then open up a Word™ document to paste the list.

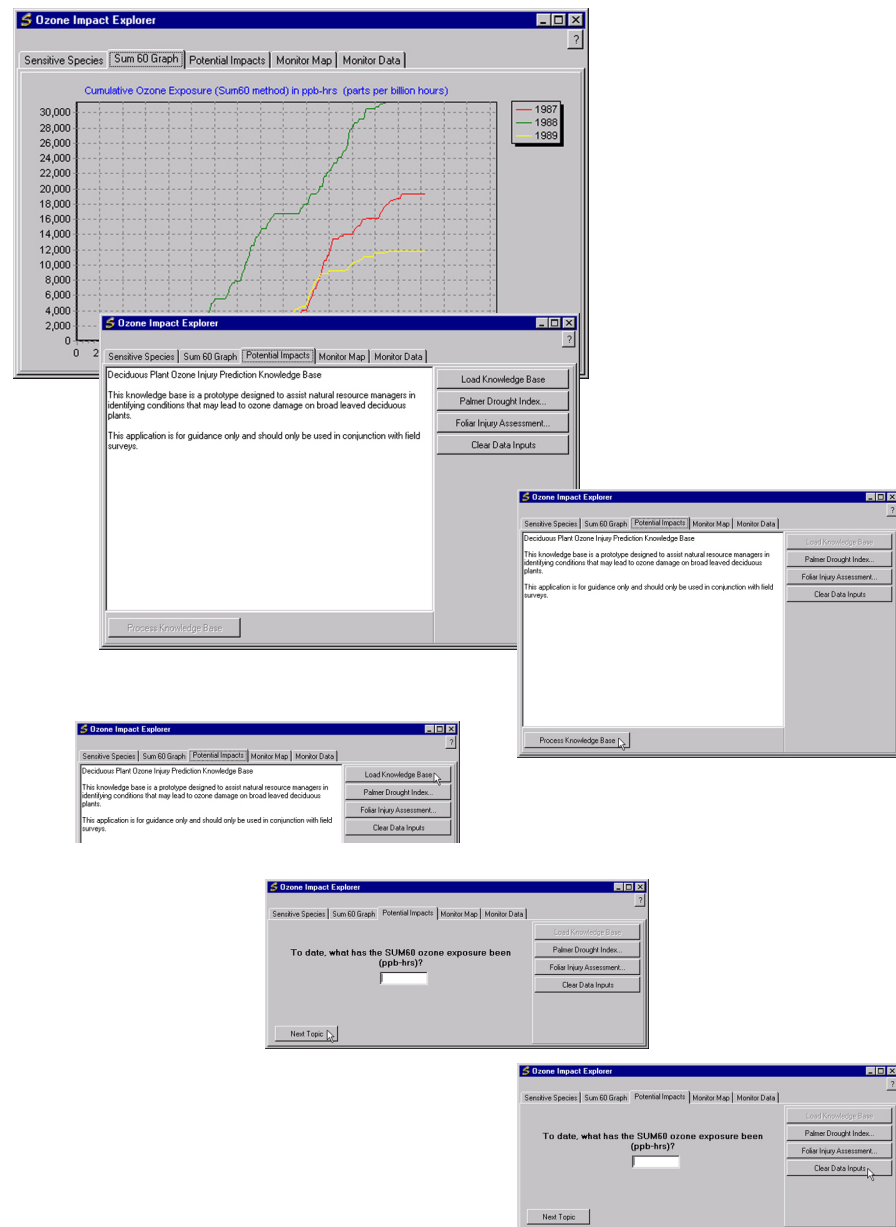


The “**Sum 60 Graph**” tab provides a graphic representation of ozone Sum 60. Depending on the number of years for which data are available, the graph takes some time to “create,” so please be patient.

The “**Potential Impacts**” tab provides access to a decision support system, which presents a list of plants that are at risk from ozone based upon the amount of ozone present (Sum 60), the degree of soil moisture (Palmer Drought Severity Index), and the presence of mature leaves.

To start this decision support system, click on the **Load Knowledge Base** button. Then, click on the **Process Knowledge Base** button at the bottom of the window.

The software will then present a window in which the user must provide the input when requested. After entering the information, click on the **Next Topic** button to advance to the next screen. To return to the original Potential Impacts screen, click on the **Clear Data Inputs** button. The output of the Ozone Injury DSS is a list of species present at the site which are either very sensitive or slightly sensitive to ozone, based on the values input for each parameter.

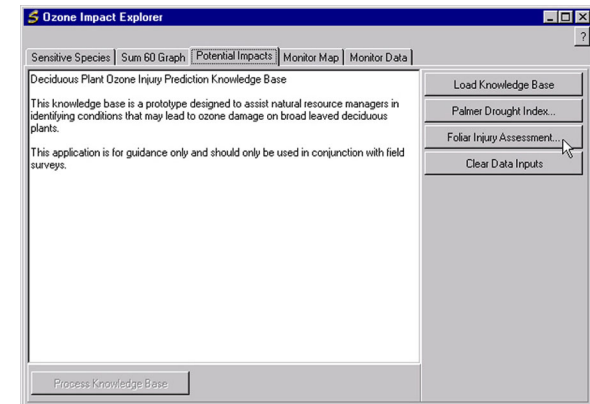
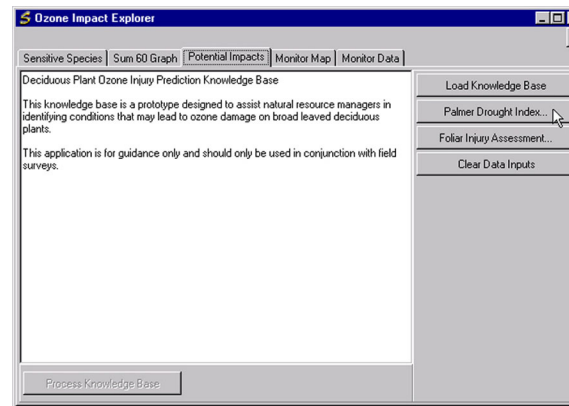


If you have an internet connection, you can look up an appropriate **Palmer Drought Severity Index** number by clicking on that button under the “**Potential Impacts**” tab, and searching the web site for data on your region/site.

The “**Potential Impacts**” tab also provides access to web-based **ForestHealth** program. You will need an internet connection to access and run ForestHealth, which may be used to train researchers/staff to correctly estimate the percent of surface area affected by ozone. Click on the **Foliar Injury Assessment** button to open the Forest Health program.

The “**Monitor Map**” tab presents a map showing the location of the site ozone monitor.

The “**Monitor Data**” tab presents a summary of the ozone monitor data in tabular form for that particular site. These data are taken from the Air Resources Division’s “Quick-Look Annual Summary Statistics Report.”



Year	Mon	MAXDMAX	NUMDMAX	AVGDMAX	NUMADMAX	MAXDMEAN	NUMDMEAN	AVGDMEAN	NUMADI
1987	7	98	29	70.206937	29	60.304348	27	49.880157	
1987	8	88	31	61.967742	31	59.73913	31	48.047558	
1987	9	79	30	61.366667	30	55.217391	30	47.690362	
1987	10	65	31	52.387097	31	55.173913	31	44.361651	
1987	11	55	30	48.1	30	50.913043	30	42.324035	
1987	12	59	30	47	30	49.173913	28	42.965903	
1987	13	98	90	64.422222	90	60.304348	88	48.488061	
1987	14	98	181	56.767956	181	60.304348	177	45.847045	
1988	1	60	28	50.785714	28	50.173913	25	47.325804	

Section Six:

Visibility Related Information and AQRVs

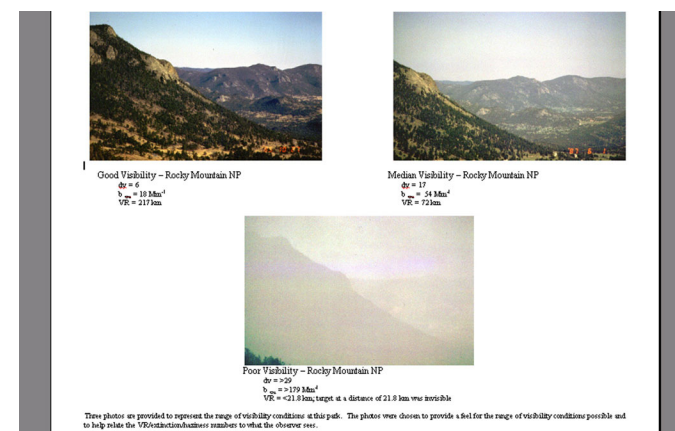
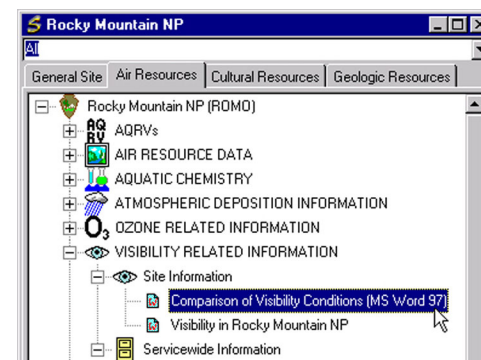
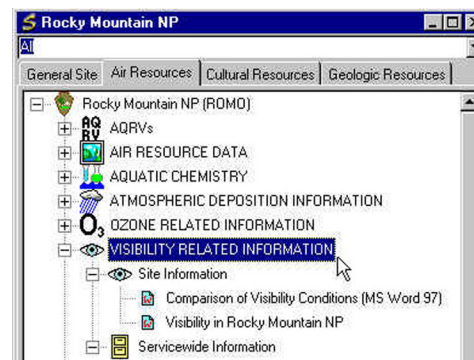
Visibility Related Information and AQRVs

Both the **Visibility Related Information** and **Air Quality Related Values (AQRVs)** categories are located in the Air Resources outline.

Visibility Related Information

The **Visibility Related Information** category is divided into **Site Information** and **Servicewide Information**. Most of the information available is in document form. Double-click on the document name to open it in Microsoft Word™.

Under the **Site Information** suboutline, you can look at a Word™ document that is the “**Comparison of Visibility Conditions.**” This document opens with three pictures taken at the site. The pictures provide examples of conditions ranging from good visibility through poor visibility. Deciview, extinction and visual range values are provided for each visibility condition.



Air Quality Related Values (AQRVs)

Many site-specific air quality related values (**AQRVs**) have not been identified at this point. However, this window illustrates one way *Synthesis* presents **AQRVs** for ozone-sensitive vegetation.

The purpose of the AQRV screen is to report lists of resources that are sensitive to air pollutants. To view images that show the effects of air pollution, refer back to **Section Two** of this manual under the “**Working with Other Images**” heading.

